SUPPORT FOR THE AMENDMENTS

Newly-added Claims 36-62 are supported by the specification and the original claims. In particular, support for 0.02 wt% or less of Cu is based paragraph [0050] Table 1 of the specification, where Cu content is 0.02 wt%, 0.01 wt% or 0.00 wt%. Support for the recitation of components in Claim 51 is based on the paragraph [0050] Table 1 of the specification, where the Si content is 1.10 wt% for alloy 11 and the Fe content is 0.55 wt% for alloys 2 and 8. The recitation of the amount of Mn in Claim 54 is also supported paragraph [0050] Table 1 of the specification, where the Mn content is 2.33 wt% for alloy 2. No new matter is believed to have been added to the present application by the amendments submitted above.

REMARKS

Claims 36-62 are pending. Favorable reconsideration is respectfully requested.

The present invention relates to a high-strength aluminum alloy fin material for heat exchangers having high strength, comprising:

aluminum,

0.8 - 1.4 wt% of Si,

0.15 - 0.7 wt% of Fe,

1.5 - 3.0 wt% of Mn,

0.5 - 2.5 wt% of Zn,

at most 0.05 wt% of Mg,

0.02 wt% or less of Cu, and

the remainder comprises impurities;

wherein said aluminum alloy fin material:

has a tensile strength before brazing of at most 240 MPa;

a tensile strength after brazing of 150 MPa or more; and

a recrystallized grain size after brazing of 500 μm or more.

See Claim 36.

As set forth in Claim 51, the present invention also relates to a high-strength aluminum alloy fin material for heat exchangers having high strength, comprising:

aluminum,

1.1 - 1.4 wt% of Si,

0.15 - 0.55 wt% of Fe,

2.2 - 3.0 wt% of Mn,

0.5 - 2.5 wt% of Zn,

at most 0.05 wt% of Mg, and

the remainder comprising impurities;

wherein said aluminum alloy fin material:

has a tensile strength before brazing of at most 240 MPa;

a tensile strength after brazing of 150 MPa or more; and

a recrystallized grain size after brazing of 500 μm or more.

As set forth in Claim 54, the present invention also relates to a high-strength aluminum alloy for heat exchangers having high strength, comprising:

aluminum,

0.8 - 1.4 wt% of Si,

0.15 - 0.7 wt% of Fe,

2.33 - 3.0 wt% of Mn,

0.5 - 2.5 wt% of Zn,

at most 0.05 wt% of Mg, and

the remainder comprising impurities;

wherein said aluminum alloy:

has a tensile strength before brazing of at most 240 MPa;

a tensile strength after brazing of 150 MPa or more; and

a recrystallized grain size after brazing of 500 μm or more.

The rejection of the claims under 35 U.S.C. §102(b)/ §103(a) over Shoji and the evidentiary references of Lyle and Sanders is respectfully traversed. These references fail to disclose the claimed invention.

Regarding Claim 36, Shoji teaches that an aluminum fin material for heat exchanger excelled in formability and brazability, comprising: 1.0 to 2.0 mass% of Mn,

0.5 to 1.3 mass% of Si, 0.1 to 0.8 mass% of Fe, 0.06 to 0.2 mass% of Cu, 0.5 to 3.0 mass% of Zn, and a ratio of Mn/Si content is from 1.0 to 3.5, and further comprising at least one or two of 0.05 to 0.3 mass% of Zr and/or 0.05 to 0.3 mass% of Cr, and remainder being unavoidable impurities and Al, where the aluminum fin material has a tensile strength is 160 to 270 MPa.

Shoji teaches (paragraph [0015]) that Cu in a fin material raises the strength of the fin material before soldering and after soldering, and it improves formability. Shoji further teaches the desirable content of Cu is 0.06 mass% - 0.2 mass%. The effect is small at less than 0.06 mass% and if 0.2 mass% is exceeded, the potential of a fin material will be noble and the sacrificial anode effect of a fin will be reduced.

A person of ordinary skill in the art, upon reading Shoji at the time the present invention was made, would have been discouraged from reducing the amount of Cu to less than 0.06 mass% in alloy 6 taught by Shoji in order to prevent the strength of the fin material before soldering and after soldering from decreasing and to prevent formability from deteriorating.

Shoji fails to teach or suggest the combined technical features of a tensile strength before brazing of at most 240 MPa, a tensile strength after brazing of 150 MPa or more and a recrystallized grain size after brazing of 500 μm or more, as specified in Claim 36, where the amounts of Mg and Cu are limited to at most 0.05 wt% and 0.02 wt% or less, respectively. Thus, a prima facie case of obviousness has not been established with respect to Claim 36.

Regarding claims 53 and 56, the Examiner alleges that Shoji discloses a high-strength aluminum alloy fin material for heat exchangers having high strength and excelling in thermal conductivity and sacrificial anode effect comprising 1.0 mass% of

Si, 0.6 mass% of Fe, 2.3 mass% of Mn, 1.0 mass% of Zn, and 0.20 mass% of Zr and remainder are unavoidable impurities and aluminum (Shoji, Table 3, alloy 14), which, according to the Examiner, lies within the instantly claimed composition (Office Action, page 7, line 19- 22).

However, Shoji teaches that an aluminum fin material for heat exchanger excelled in formability and brazability, comprising: Mn: 1.0 to 2.0 mass%, Si: 0.5 to 1.3 mass%, Fe: 0.1 to 0.8 mass%, Cu: 0.06 to 0.2 mass%, Zn: 0.5 to 3.0 mass%, and a ratio of Mn/Si is from 1.0 to 3.5, and further comprising at least one or two of Zr: 0.05 to 0.3 mass% and/or Cr: 0.05 to 0.3 mass%, and the remainder being unavoidable impurities and Al, where the aluminum fin material has a tensile strength is 160 to 270 MPa.

Shoji teaches that for a material of No. 16 (alloy 14), a fin material with good quality could not be manufactured due to difficulty in hot rolling since it contained high amount of Mn (paragraph [0040]). Further, Shoji teaches that the composition of alloy14 is outside the claimed range of Shoji so that the fin material of No. 16 having the composition of alloy 14 is a comparable example.

Shoji teaches that the effect is small at less than 1.0 mass% of Mn, and if contained exceeding 2.0 mass% of Mn, crystallized material big and rough at the time of casting will generate, manufacture of a plate will become difficult, further, the amount of dissolution of Mn increases and thermal conductivity falls (paragraph [0011]).

One of ordinary skill in the art, upon reading Shoji at the time the present invention was made, would not have cast a slab having said composition of alloy containing over 2.0 mass% of Mn as taught by Shoji since a fin material with good quality could not be manufactured due to difficulty in hot rolling and thermal

conductivity falls due to high amount of Mn in solid solution in matrix even if a fin material is unfortunately obtained, according to Shoji.

Shoji fails to teach or suggest the combined technical features of a tensile strength before brazing of at most 240 MPa, a tensile strength after brazing of 150 MPa or more and a recrystallized grain size after brazing of 500 μm or more containing 2.2-3.0 wt% of Mn, 0.5-2.5 wt% of Zn, and at most 0.05 wt% of Mg, as specified in Claim 51.

Shoji fails to teach or suggest the combined technical features of a tensile strength before brazing of at most 240 MPa, a tensile strength after brazing of 150 MPa or more and a recrystallized grain size after brazing of 500 μm or more containing, 2.33-3.0 wt% of Mn, 0.5-2.5 wt% of Zn, and at most 0.05 wt% of Mg, as specified in Claim 54. Thus, a prima facie case of obviousness has not been established in this case with respect to either Claim 51 or Claim 54.

In addition, obviousness cannot be sustained by mere conclusive statements of one's own personal understanding or experience, or on the assessment of what would be basic knowledge or common sense, rather, the Office Action must point out some concrete evidence in the record to support a legal conclusion of obviousness (MPEP §2144.03).

Further, it is well settled in U.S. Patent law that a reference is said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant (MPEP §2141.02(IV) and §2145(X)(D)).

Moreover, if the proposed modification would render the prior art invention being modified unsatisfactory or inoperable for its intended purposes, then there is no suggestion or motivation to make the proposed modification (MPEP §2143.01(V)).

In view of the foregoing, the Shoji et al alone or in view of the evidentiary references, fails to disclose or suggest the claimed inventions. Accordingly, the subject matter of the pending claims is neither anticipated nor obvious over those references. Withdrawal of these grounds of rejection is respectfully requested.

The rejections of the claims under 35 U.S.C. §112, first and second paragraph, are believed to be obviated by the amendments submitted above

The issues raised in the Office Action are believed to be addressed in the newly-added claims. Accordingly, withdrawal of these grounds of rejection is respectfully requested.

Applicants submit that the present application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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